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HOSIERY PRODUCTION IN THE UNITED STATES  
WITH SPECIAL REFERENCE TO THE USE OF COTTON

by

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## HOSIERY PRODUCTION IN THE UNITED STATES WITH SPECIAL REFERENCE TO THE USE OF COTTON

This report discusses some of the outstanding factors affecting the use of various fibers in the production of hosiery over a period of years. It is part of a broader program designed to reestablish a wider use of cotton in the making of hosiery.

### CHANGES IN DOMESTIC HOSIERY PRODUCTION

#### Total Full-Fashioned and Seamless

Total production of hosiery in the United States increased steadily from 1923 to 1929 (table 1). In 1931, there was a decided drop from which production has not yet fully recovered. Men's all-rayon hose and men's rayon hose with cotton tops, heels, and toes, and women's all-silk hose were the only types that continued to increase during that year. Total production in 1937 lacked 10 percent of equaling the 1929 high.

During the 10 biennial years for which we have data, from 1919 to 1937, census figures show that the majority of hosiery produced each year was seamless. In 1919, only 9 percent of total hosiery produced were full-fashioned. In 1937, they amounted to 36 percent of total. Of these, more than 99 percent were women's. As in earlier years, nearly all men's and children's hose were seamless (fig. 1).



Table 1.--Hosiery production, total seamless and full-fashioned, by fiber classification, United States, census years 1919-35, and 1937 <sup>1/</sup>

Types	Million dozen pairs									
	1919	1921	1923	1925	1927	1929	1931	1933	1935	1937
Total.....	84.6	80.2	97.4	103.7	109.6	118.5	103.9	105.1	115.9	106.6
Cotton.....	60.6	50.9	57.6	50.4	46.2	35.2	24.7	29.2	30.2	28.2
Cotton-mixed	4.2	4.5	7.9	7.7	14.4	23.3	15.5	17.2	16.0	14.6
Rayon <sup>2/</sup> .....	1.6	2.0	2.8	12.4	13.1	16.4	20.4	15.7	18.4	17.7
Silk <sup>2/</sup> .....	2.9	4.1	4.6	19.7	22.7	30.6	29.4	33.0	41.0	42.6
Wool.....	1.0	1.5	1.2	.6	.7	.4	.3	.4	1.0	.8
All other <sup>3/</sup>	14.3	17.2	23.3	12.9	12.5	12.6	13.6	9.6	9.3	2.7
Men's, etc. <sup>4/</sup>	33.2	28.2	37.8	44.1	64.5	66.1	59.1	57.1	62.9	49.6
Cotton.....	23.8	20.7	22.9	21.8	35.4	27.9	20.3	23.3	23.3	20.6
Cotton-mixed	3.2	1.9	4.5	5.9	12.7	18.1	15.4	15.8	14.8	12.5
Rayon <sup>2/</sup> .....	.8	.4	.6	5.5	8.1	9.2	13.3	11.1	14.4	12.7
Silk <sup>2/</sup> .....	1.1	1.5	1.5	3.3	2.1	2.3	1.6	2.1	1.8	1.5
Wool.....	.6	.4	.6	.3	.6	.4	.3	.4	.9	.7
All other <sup>5/</sup>	3.7	3.3	7.7	7.3	5.6	8.2	8.2	4.4	7.7	1.6
Women's.....	51.4	52.0	59.6	59.6	44.2	51.3	42.7	45.7	49.9	47.9
Cotton.....	36.8	30.2	34.7	28.6	10.8	7.3	4.4	5.9	4.3	2.0
Cotton-mixed	1.0	2.6	3.4	1.8	1.7	5.2	.1	1.4	.8	1.3
Rayon <sup>2/</sup> .....	.8	1.6	2.2	6.9	5.0	7.2	7.1	4.6	4.0	2.5
Silk <sup>2/</sup> .....	1.8	2.6	3.1	16.4	20.6	28.3	27.8	30.9	39.2	41.1
Wool.....	.4	1.1	.6	.3	.1	—	—	—	—	<sup>6/</sup>
All other <sup>7/</sup>	10.6	13.9	15.6	5.6	6.0	3.3	3.3	2.9	1.6	1.0
Athletic <sup>8/</sup>	—	—	—	—	.9	1.1	2.1	2.3	3.1	9.1
Cotton.....	—	—	—	—	—	—	—	—	2.6	5.6
Cotton-mixed	—	—	—	—	—	—	—	—	.4	.8
Rayon <sup>2/</sup> .....	—	—	—	—	—	—	—	—	—	2.5
Silk <sup>2/</sup> .....	—	—	—	—	—	—	—	—	—	<sup>6/</sup>
Wool.....	—	—	—	—	—	—	—	—	.1	.1
All other <sup>9/</sup>	—	—	—	—	.9	1.1	2.1	2.3	—	.1

<sup>1/</sup> The data for this year are not biennial census figures. The original figures represent approximately 89 percent of the industry and have been raised to 100 percent.

<sup>2/</sup> Mostly with cotton tops, heels, and toes. Athletic and golf hose are all with cotton tops, heels and toes.

<sup>3/</sup> Includes infants' hose not classified in 1925; athletic and golf hose not classified from 1927 to 1933 inclusive; and all anklets not classified and separated in 1933 and 1935.

<sup>4/</sup> Men's, boys', misses', children's, and infants' hose.

<sup>5/</sup> Includes infants' hose not classified in 1925; and anklets not classified and separated in 1933 and 1935.

<sup>6/</sup> Less than one-tenth.

<sup>7/</sup> Includes women's anklets not classified and separated in 1933 and 1935.

<sup>8/</sup> Athletic and golf hose; includes "other hosiery and anklets" in 1937.

<sup>9/</sup> Not classified from 1927 to 1933 inclusive.



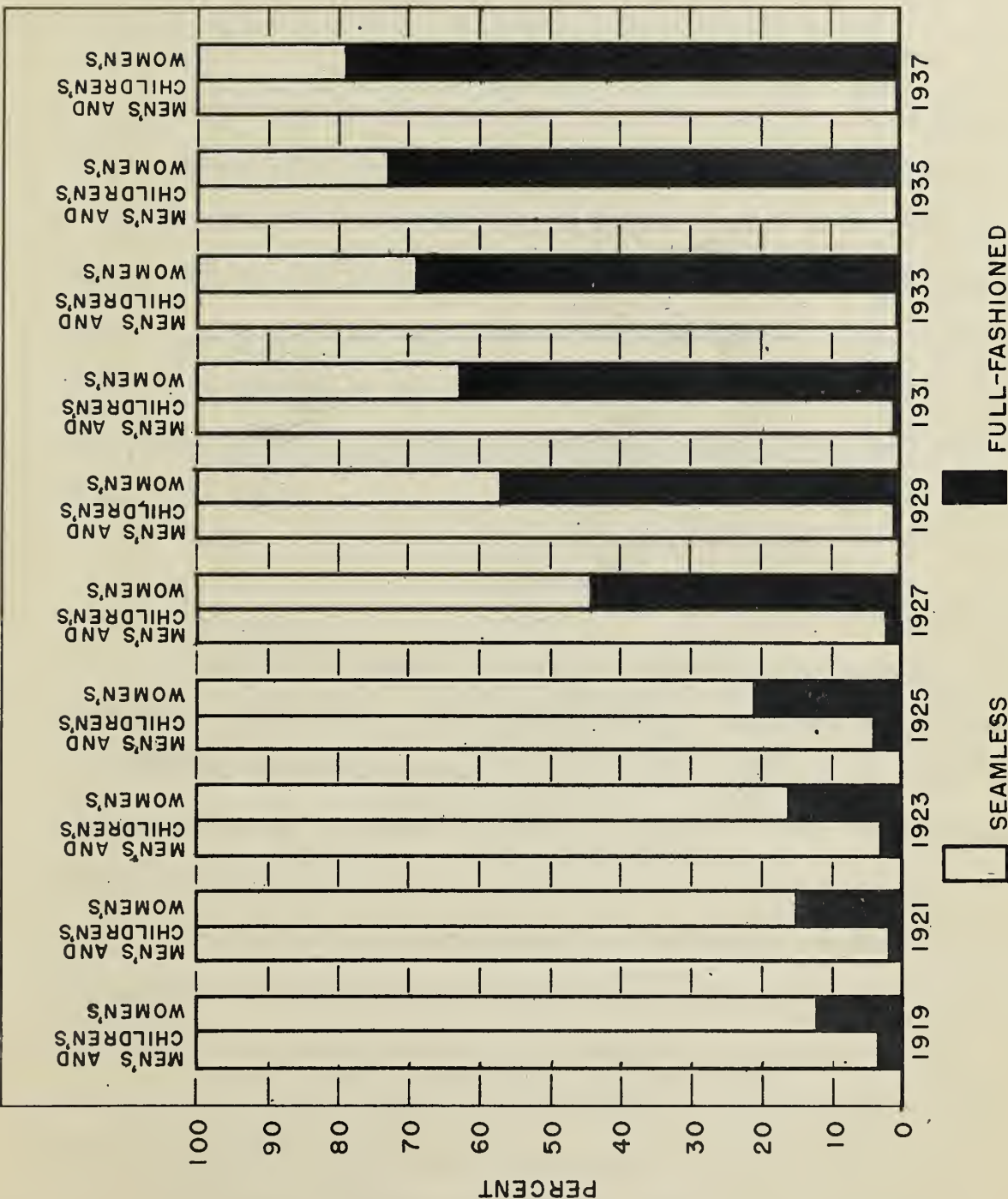


Figure 1.--Percentage distribution of men's and children's, and of women's full-fashioned and seamless hosiery, United States, census years 1919-37.



Although full-fashioned hose for women have been increasing each year since 1919, the larger part of women's hosiery was seamless up to and including 1927. In 1929 women's full-fashioned hosiery exceeded seamless, and in 1937 it amounted to 79 percent of total women's hosiery produced. This shift in women's hosiery from seamless to full-fashioned appears to be related to the growth in silk hosiery production. Of total production of women's full-fashioned hosiery in 1937, 95 percent were silk.

#### Cotton

The greatest changes in hosiery production have occurred in cotton and in silk hosiery. Production of cotton hosiery has declined both absolutely and relatively--from 61 million dozen pairs in 1919, or 72 percent of total, to less than half this amount in 1937, or 26 percent of total (tables 1 and 2).

Women's hosiery has accounted for the greater proportion of this decrease in consumption of cotton hosiery (figure 2). In 1919, about 72 percent of all women's hose, mostly seamless, were made of cotton. Since then the use of cotton in women's hose has declined tremendously. By 1937 less than 5 percent were of cotton.

Men's and children's cotton hose have not decreased so much as women's, but the trend has been downward. Cotton hose for this group

Table 2.--Percentage fiber distribution in hosiery production, total seamless and full-fashioned, United States, census years 1919-35, and 1937<sup>1/</sup>

Types	Percent									
	1919	1921	1923	1925	1927	1929	1931	1933	1935	1937
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Cotton.....	71.6	63.5	59.2	48.6	42.2	29.7	23.8	27.8	26.0	26.4
Cotton-mixed.	5.0	5.6	8.1	7.4	13.1	19.7	14.9	16.4	13.8	13.7
Rayon <sup>2/</sup> .....	1.9	2.5	2.9	12.0	12.0	13.9	19.6	14.9	15.9	16.6
Silk <sup>2/</sup> .....	3.4	5.1	4.7	19.0	20.7	25.8	28.3	31.4	35.4	40.0
Wool.....	1.2	1.9	1.2	.6	.6	.3	.3	.4	.9	.8
All other <sup>3/</sup> ..	16.9	21.4	23.9	12.4	11.4	10.6	13.1	9.1	8.0	2.5
Men's, etc. <sup>4/</sup> ..	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Cotton.....	71.7	73.4	60.6	49.4	54.9	42.2	34.3	40.8	37.1	41.6
Cotton-mixed.	9.6	6.8	11.9	13.4	19.7	27.4	26.1	27.7	23.5	25.2
Rayon <sup>2/</sup> .....	2.4	1.4	1.6	12.5	12.5	13.9	22.5	19.4	22.9	25.6
Silk <sup>2/</sup> .....	3.3	5.3	3.9	7.5	3.3	3.5	2.7	3.7	2.9	3.0
Wool.....	1.8	1.4	1.6	.7	.9	.6	.5	.7	1.4	1.4
All other <sup>5/</sup> ..	11.2	11.7	20.4	16.5	8.7	12.4	13.9	7.7	12.2	3.2
Women's.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Cotton.....	71.6	58.1	58.2	48.0	24.4	14.3	10.3	12.9	8.6	4.2
Cotton-mixed.	1.9	5.0	5.7	3.0	3.9	10.1	.3	3.1	1.6	2.7
Rayon <sup>2/</sup> .....	1.6	3.1	3.7	11.6	11.3	14.0	16.6	10.1	8.0	5.2
Silk <sup>2/</sup> .....	3.5	5.0	5.2	27.5	46.6	55.2	65.1	67.6	78.6	85.8
Wool.....	.8	2.1	1.0	.5	.2	--	--	--	--	--
All other <sup>6/</sup> ..	20.6	26.7	26.2	9.4	13.6	6.4	7.7	6.3	3.2	2.1
Athletic <sup>7/</sup> ....	--	--	--	--	100.0	100.0	100.0	100.0	100.0	100.0
Cotton.....	--	--	--	--	--	--	--	--	83.9	61.5
Cotton-mixed.	--	--	--	--	--	--	--	--	12.9	8.8
Rayon <sup>2/</sup> .....	--	--	--	--	--	--	--	--	--	27.5
Silk <sup>2/</sup> .....	--	--	--	--	--	--	--	--	--	--
Wool.....	--	--	--	--	--	--	--	--	3.2	1.1
All other <sup>8/</sup> ..	--	--	--	--	100.0	100.0	100.0	100.0	--	1.1

<sup>1/</sup> The data for this year are not biennial census figures. The original figures represent approximately 89 percent of the industry and have been raised to 100 percent.

<sup>2/</sup> Mostly with cotton tops, heels, and toes; athletic and golf hose are all with cotton tops, heels, and toes.

<sup>3/</sup> Includes infants' hose not classified in 1925; athletic and golf hose not classified from 1927 to 1933 inclusive; and all anklets, not classified and separated in 1933 and 1935.

<sup>4/</sup> Men's, boys', misses', children's, and infants' hose.

<sup>5/</sup> Includes infants' hose not classified in 1925 and anklets not classified and separated in 1933 and 1935.

<sup>6/</sup> Includes women's anklets not classified and separated in 1933 and 1935.

<sup>7/</sup> Athletic and golf hose; includes "other hosiery and anklets" in 1937.

<sup>8/</sup> Not classified from 1927 to 1933 inclusive.



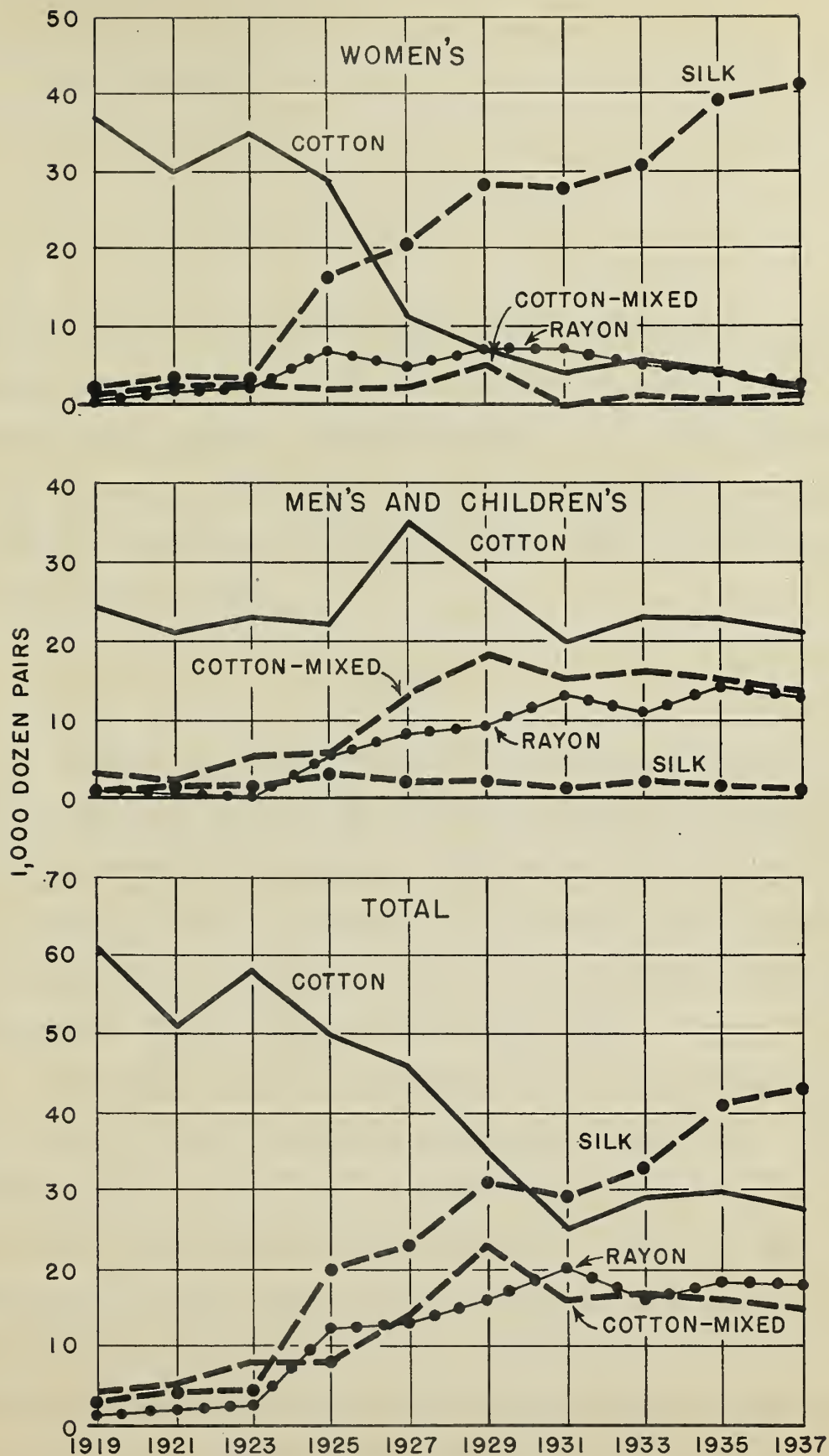
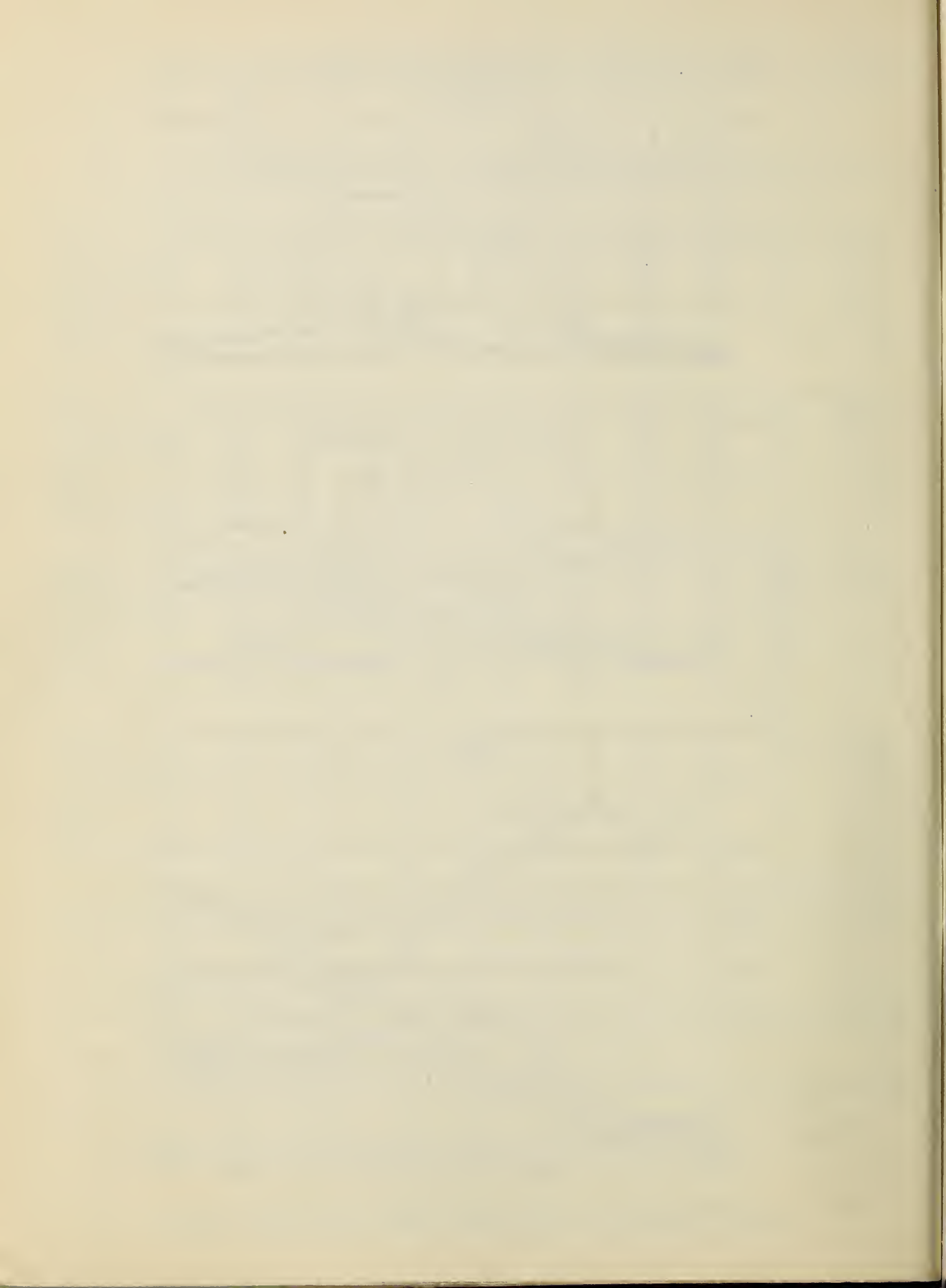


Figure 2.--Total, men's and children's, and women's hosiery production, by principal fibers, census years 1919-27.



reached a high of over 35 million dozen pairs in 1927. Even so, the proportion to other types in this year was down more than 15 percent from what it was in 1919. In 1937, production had decreased to a little less than 21 million dozen pairs, and amounted to slightly more than two-fifths of total men's and children's hose, compared with approximately three-quarters in 1919.

#### Rayon

Production of rayon hosiery, both all-rayon and rayon with cotton tops, heels, and toes kept pace with the increased production of this fiber up until 1931 (figure 2). There was a drop of about 25 percent in 1933, and then a considerable rise in 1935. The proportion of total rayon hosiery to all other types was slightly larger in 1937 than in 1935 but was down 13 percent from the 1931 high.

The rayon hose made in the early days of rayon hosiery production were not popular with women because of their shiny appearance. The dull synthetic yarns which came into use about 1929 did away with this objectionable feature, and production of rayon hosiery for women was highest during this year and in 1931. This increased production at this time was partly at the expense of women's silk hosiery. Rayon hosiery for women has decreased in numbers since, however. In 1931, these hose were approximately 17 percent of total women's hosiery produced; in 1937, 5.2 percent.



More rayon hosiery was made for women than for men and children up to 1925. The census year 1927 shows a complete reversal, however. Since then, men's and children's rayon hosiery has increased so much in proportion to women's that in 1937 the volume was more than 5 times as large. The growing importance of the use of rayon for this group has been partly responsible for the decline in the use of cotton hosiery. Production of rayon hosiery for men and children has just about balanced the reduction in cotton hosiery in this category.

#### Silk

Total production of all-silk hosiery and silk hosiery with cotton tops, heels, and toes has been increasing steadily since 1919, with the exception of 1931, when there occurred a slight decrease. From 1919 to 1925, the proportion of women's silk hose to all other kinds was negligible, but today, nearly all of the silk hosiery produced is for women. In 1937 it amounted to 86 percent of total women's hosiery produced. Even 55 percent of women's seamless hose in this year were silk.

All-rayon and all-silk hose do not have the general wear-resistance of those reenforced with cotton at the tops, heels, and toes. This *use* of cotton also permits the hose to be sold cheaper. At one time, all-silk hose were used only for evening wear. In 1929, however, women's all-silk hose took a decided jump in production and have been increasing so much

in proportion to silk hose with cotton tops, heels, and toes that in 1935 they exceeded the latter in total number. Finer yarn gauges and high twist yarns have been instrumental in improving the wearing qualities of these hose, thus making them practical for day wear.

### Wool

There have been changes in the production of woolen hosiery also. Production of these hose is so small, however, as to be relatively unimportant. In 1921, they amounted to about 2 percent of total hosiery produced. From 1929 to 1933, they were down to less than one-half of one percent, but showed a small increase in 1935. In 1935 and 1937 they amounted to about one percent of total hosiery production.

Almost the entire amount of woolen hosiery produced today is for men and children. Up to 1927, the number of these hose produced each year was about equally distributed between men and women. In 1927, the production of women's woolen hosiery was negligible, and the next 4 census years show no data for production of these hose for women. In 1937 they amounted to less than 14,000 dozen pairs, whereas men's and children's were 717,000 dozen pairs.

### Mixed Fibers

In many hose, cotton is used in combination with other fibers. The cotton in these hose ranges from 60 percent for children's hose

to 68 percent for men's. <sup>1/</sup> The increase in production of cotton-mixed hose reached its maximum in 1929. In 1937 production of these hose was down to the 1927 level, but was still about 4 times as large as in 1919.

Cotton and wool mixed hosiery for women averaged over 2 million dozen pairs a year from 1919 to 1925. In 1925 rayon and silk mixed hose for women surpassed production of cotton and wool mixed. These amounted to almost 3 and one-half million dozen pairs in 1927, but in 1929 decreased over one million dozen pairs. That year cotton and rayon mixtures and cotton and silk amounted to approximately 5 million dozen pairs. During the following 4 census years, production of women's hosiery made of mixed fibers was negligible. In 1937, cotton and silk and rayon-silk mixed hose, the 2 largest groups, were each considerably less than one million dozen pairs.

Since 1927 a large percentage of cotton-mixed hosiery has been for men and children. Cotton-and-wool mixed hosiery was the largest group of mixed hose for this class up to 1927, when it was surpassed by cotton and rayon mixtures. The high point in production of cotton and rayon mixed hose was reached in 1929. The next largest mixed-fiber group for men and children was the rayon and silk combination, but these have always been considerably smaller than cotton and wool mixed. They amounted to less than one million dozen pairs in 1937.

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<sup>1/</sup> From an unpublished study of the Agricultural Adjustment Administration by E. H. Omohundro. Dec. 1934.

## HOSIERY IMPORTS

The majority of our hosiery imports before and after the World War has been of cotton, mostly from Germany. During recent years, a large part of these imports has been from Japan (table 3). The "gentlemen's agreement" arrived at by representatives of the United States and Japanese cotton industries in 1937, together with the hostilities in which Japan has been engaged, were no doubt instrumental in reducing total imports of cotton hosiery from that country in 1937 and 1938. An earlier rate agreement with several countries affected embroidered cotton hosiery only.

Imports of cotton hosiery, however, and even of total hosiery, are small. They have always been only a small percentage of total hosiery produced in this country. Imports of cotton hosiery in 1914, when they were comparatively large, were 3 percent of hosiery production in that year. Other hosiery imports were not recorded in 1914.

Beginning with 1916, there was a drastic curtailment in imports of cotton hosiery into the United States. It is doubtful, however, if this curtailment, due to war conditions at that time, can be considered a contributing factor in the eventual decline in consumption of cotton hosiery in this country. For, in 1919, when cotton hosiery imports were the second smallest on record, cotton hosiery produced in the United States amounted to 72 percent of total hosiery production.

Cotton hosiery imports for consumption in 1936 were the largest since 1912, and a little more than 3 times as large as in 1935. The



Table 3.—Imports of cotton hosiery, selected countries, and imports for consumption of cotton hosiery and total hosiery, United States, 1911-38

Year	Countries <sup>2/</sup>				Total imports	Imports for consumption	
	Germany	United Kingdom	Japan	All others		Cotton	Total
	1,000 dozen pairs	1,000 dozen pairs	1,000 dozen pairs	1,000 dozen pairs	1,000 dozen pairs	1,000 dozen pairs	1,000 dozen pairs
1911.....	2,719	14	<sup>3/</sup>	18	2,751	2,933	2,933
1912.....	2,203	14	<sup>3/</sup>	10	2,227	2,350	2,350
1913.....	2,132	14	<sup>3/</sup>	8	2,154	2,029	2,029
1914.....	2,375	18	<sup>3/</sup>	26	2,419	2,194	2,194
1915.....	1,253	15	1	32	1,301	1,365	1,435
1916.....	51	16	<sup>3/</sup>	8	75	219	250
1917.....	1	23	3	5	32	64	98
1918.....	-	15	99	2	116	108	557
1919.....	<sup>3/</sup>	13	42	11	66	66	109
1920.....	168	42	11	7	228	154	534
1921.....	725	15	1	15	756	704	1,120
1922.....	1,322	23	1	12	1,358	1,210	1,964
1923.....	571	23	1	17	612	427	913
1924.....	480	34	<sup>3/</sup>	17	531	398	891
1925.....	489	52	<sup>3/</sup>	22	563	475	1,008
1926.....	428	29	2	38	497	424	819
1927.....	432	35	3	58	528	419	828
1928.....	677	47	6	67	797	604	1,081
1929.....	753	62	15	82	912	788	1,334
1930.....	380	35	34	63	512	543	790
1931.....	487	29	55	29	600	554	802
1932.....	397	17	62	45	521	471	653
1933.....	290	25	187	75	577	448	659
1934.....	70	24	271	91	456	456	598
1935.....	34	10	645	57	746	746	940
1936.....	21	17	2,144	131	2,313	2,313	2,590
1937.....	20	33	1,419	177	1,649	1,649	1,976
1938.....	18	10	602	83	713	713	970

<sup>1/</sup> There is a distinction between general imports and imports for consumption. The former constitutes commodities entered for immediate consumption and for storage in warehouses. The latter includes all commodities entered for immediate consumption, plus withdrawals from warehouses for consumption.

<sup>2/</sup> Imports for consumption, by countries, not available prior to 1934. General imports up to 1933 inclusive.

<sup>3/</sup> Less than 500 dozen pairs.

Bureau of Home Economics. Compiled from Foreign Commerce and Navigation of the United States, United States Bureau of Foreign and Domestic Commerce. Fiscal years ending June 30 up to 1917 inclusive.

only appreciable increase in production of cotton hosiery during recent years occurred in 1933. It may be that the importation of larger amounts of cotton hosiery, which began in 1936, was a result of the increase in popularity of cotton hosiery in this country about this time. It would appear, then, that decreased imports of cotton hosiery do not affect adversely the production of these stockings, but rather that increased consumption acts as a stimulating factor toward increased imports.

Woolen hosiery imports are second in importance to imports of cotton hosiery. In 1918 and 1920, and from 1923 to 1925, imports of woolen hosiery were larger than those of cotton hosiery. Silk and rayon hosiery imports are negligible.

#### HOSIERY EXPORTS

United States exports of cotton hosiery in 1919 amounted to 16 percent of total domestic cotton hosiery production. This reduced considerably the number of cotton hose available for consumption in that year. In 1921, however, exports of total and of cotton hosiery declined tremendously, and the trend since then has been downward (table 4). Total hosiery exports in that year were only 25.7 percent of 1920 exports.

Compared with the 10 earlier years, average total exports during the 10 years 1929-38 were less than one-quarter. For these same

Table 4.—United States hosiery exports, by kinds and total, 1918-38

Year	Cotton	Silk	Rayon	Total
	1,000 doz. prs.	1,000 doz. prs.	1,000 doz. prs.	1,000 doz. prs.
1918.....	5,574	---	632	6,206
1919.....	9,477	---	1,594	11,071
1920.....	11,576	---	807	12,383
1921.....	2,508	---	670	3,178
1922.....	4,793	343	1,439	6,575
1923.....	5,160	441	1,113	6,714
1924.....	4,826	755	845	6,426
1925.....	5,534	1,202	1,561	8,297
1926.....	4,745	960	1,252	6,957
1927.....	4,337	779	1,172	6,288
1928.....	3,877	900	1,091	5,868
1929.....	3,778	922	1,079	5,779
1930.....	2,253	613	583	3,449
1931.....	1,122	416	311	1,849
1932.....	709	250	200	1,159
1933.....	413	245	140	798
1934.....	246	221	121	588
1935.....	214	282	121	617
1936.....	322	442	149	913
1937.....	406	460	209	1,075
1938.....	371	500	161	1,032

Bureau of Home Economics. Compiled from Foreign Commerce and Navigation of the United States, United States Bureau of Foreign and Domestic Commerce.



10-year periods, exports of cotton hosiery with respect to exports of other hosiery declined considerably. During the 10 years 1919-28, cotton hosiery exports were 77 percent of total; silk, 7 percent; and rayon, 16 percent. For the 10 years 1929-38, cotton hosiery exports were 57 percent of total; silk, 25 percent; and rayon, 18 percent. Exports of silk hosiery in each of the last 4 years were larger than cotton hosiery exports.

An increase in volume of hosiery exports to the 1920 level would aid considerably in stimulating hosiery production in this country. Most United States hosiery exports today go to South and Central American countries and to the Philippine Islands. Over half the total exports are women's hosiery. It is not possible to determine just how much of the decline in hosiery exports is attributable to the summer bare-legged fad now common in many countries. The loss of large portions of some markets to other countries, for various reasons, must also be taken into consideration.

During the 10 years 1919-28, United States exports of all hosiery were almost 8 times as large as total imports for consumption. Cotton hosiery exports were about 12 times as large as cotton hosiery imports. The following 10 years, both total and cotton hosiery exports were only a little larger than imports for consumption.

### VALUE PER UNIT

For the 10 census years 1919-37 (value for 1937 estimated), the average value <sup>2/</sup> of total hosiery produced was 29 cents a pair; total hosiery imported 44 cents a pair; and total exported, 26 cents. During this same period, production of cotton hosiery was 41 percent of total, and the value 13 cents a pair. Imports of cotton hosiery, valued at 28 cents a pair, were 64 percent of total hosiery imports. Cotton hosiery exports, valued at 15 cents a pair, were 72 percent of total exports. Import values include duty paid. Equivalent ad valorem rates during this period were considerably less than for earlier years when hosiery imports were quite large.

The relatively high price of embroidered and plain woolen hosiery imported is chiefly responsible for the high value of total hosiery imports. The value per unit of imported silk and embroidered cotton hosiery for these years was larger than for woolen hosiery, but total imports of these hose were small. The value of embroidered cotton hosiery, however, has raised the total value of cotton hosiery imports.

The average value for all types of hosiery produced, imported and exported was smaller in the last 10 years than during the 10 years prior to that. The largest decrease in value was in cotton hosiery imported for consumption. Due to the cheaper quality of cotton hose

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<sup>2/</sup> Selling values at factory or plant. Covers cost of production, including overhead expenses and profits.

imported in recent years, these were down to less than half the 1918-27 average value.

#### PER CAPITA CONSUMPTION

Total domestic per capita consumption of hosiery increased from about 8 and one-half pairs in 1919 to approximately 11 pairs in the late 20's (table 5 and figure 3). Estimated average world consumption is about 3 pairs per person. The United States leads in consumption of hosiery per person as well as in production. Variations from year to year in this country are small, however. In 1929, when industrial activity was at its peak, men, women, and children in the United States used slightly more than 11 pairs of hose, against 10 pairs for several later years. Therefore, though style, comparative durability, and consumer income doubtless affect, to some extent, total use of hosiery from year to year, total consumption has remained comparatively stable.

Per capita consumption of cotton hosiery has been cut more than half since 1919. The decline from nearly 6 pairs per person in that year to less than 3 pairs in 1937 is significant. The low point occurred in 1931. There has been a little increase since that time attributable, partly, to men's and children's hosiery, and to the larger use of cotton anklets and other sports hose. Cotton-mixed hose, on the other hand, showed a rapid rise in per capita consumption up to 1929, but has declined since.

Table 5.-- Per capita consumption <sup>1/</sup> of hosiery, by kinds, United States, census years 1919-37

Year	Total	Kinds					
		Cotton	Cotton- mixed	Rayon <sup>2/</sup>	Silk <sup>2/</sup>	Wool	All Other <sup>3/</sup>
	<u>Pairs</u>	<u>Pairs</u>	<u>Pairs</u>	<u>Pairs</u>	<u>Pairs</u>	<u>Pairs</u>	<u>Pairs</u>
1919.....	8.4	5.9	.5	-	.3	.1	1.6
1921.....	8.7	5.5	.5	.2	.4	.2	1.9
1923.....	9.8	5.7	.8	.2	.4	.2	2.5
1925.....	10.1	4.8	.8	1.1	1.9	.1	1.4
1927.....	10.6	4.3	1.5	1.2	2.2	.1	1.3
1929.....	11.2	3.2	2.3	1.5	2.9	.1	1.2
1931.....	9.9	2.3	1.5	2.0	2.8	<u>.4</u>	1.3
1933.....	10.0	2.8	1.6	1.5	3.1	.1	.9
1935.....	10.9	2.9	1.5	1.7	3.8	.1	.9
1937.....	10.0	2.7	1.4	1.6	3.9	.1	.3

<sup>1/</sup> Production plus imports for consumption minus exports.

<sup>2/</sup> Mostly with cotton tops, heels, and toes.

<sup>3/</sup> Rayon and silk, rayon and wool, silk and wool, and triple mixtures.

<sup>4/</sup> Less than one-tenth.

Bureau of Home Economics. Data obtained from reports of the Bureau of the Census and the Bureau of Foreign and Domestic Commerce.

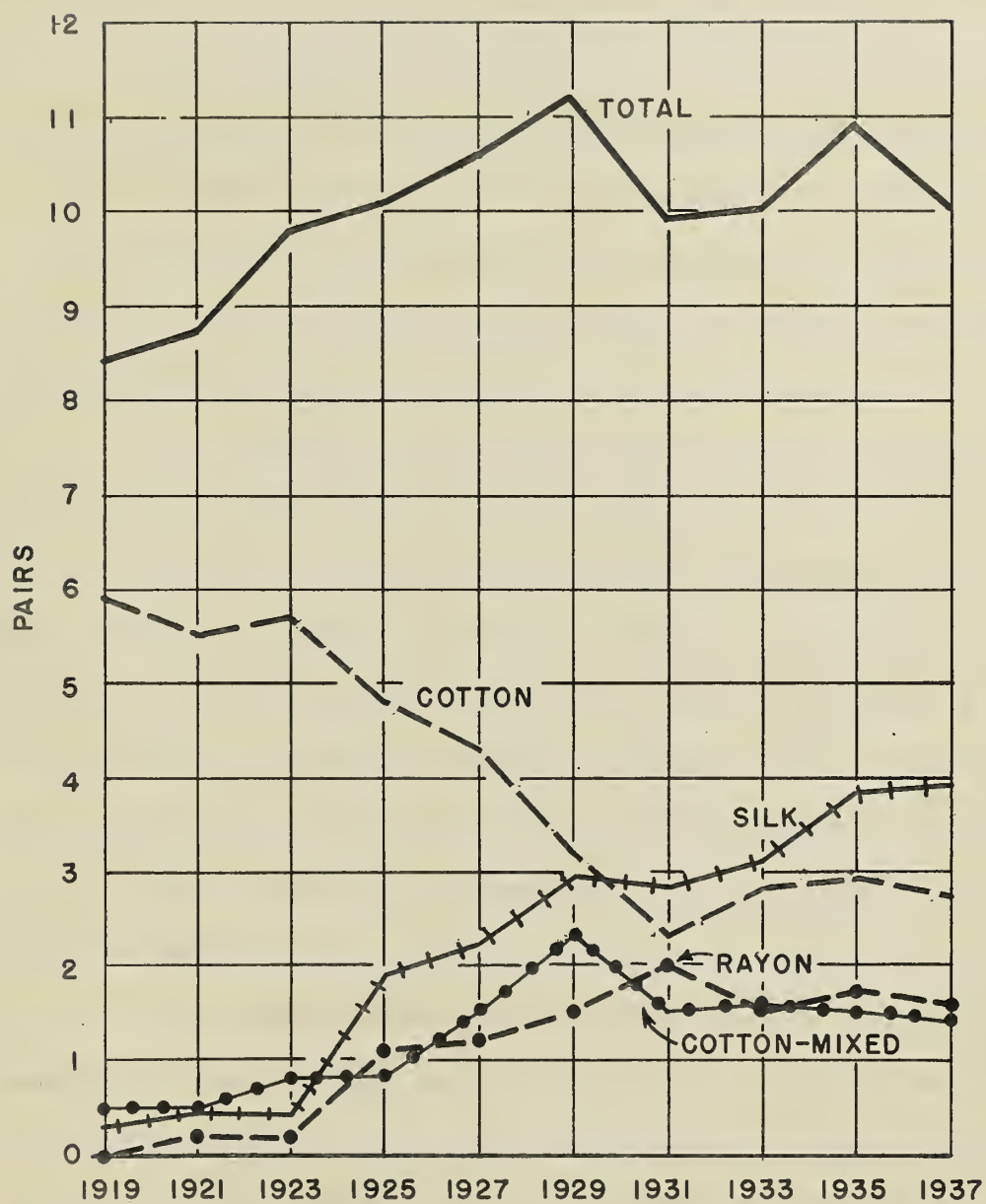
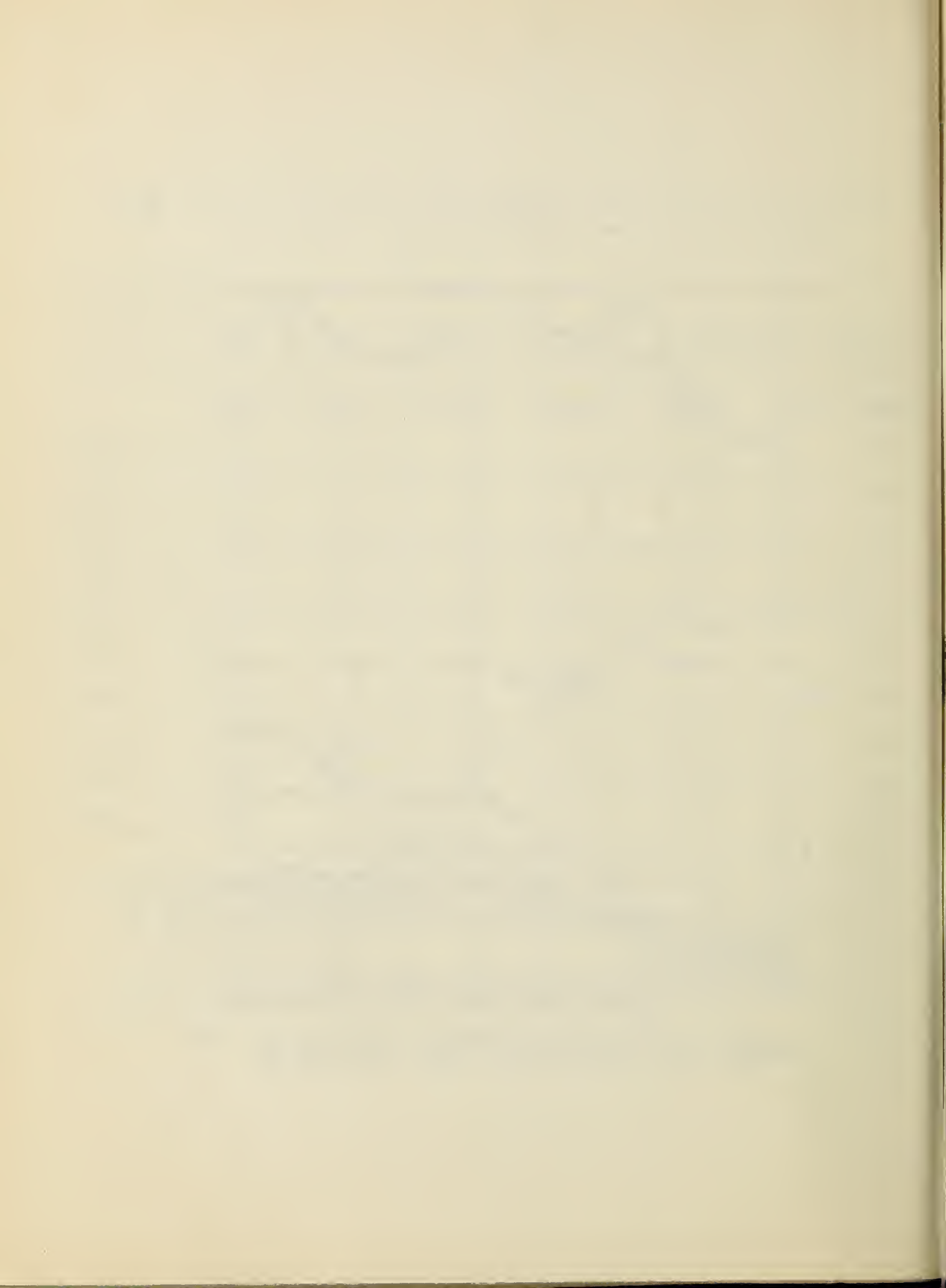


Figure 3.--Per capita consumption of hosiery, total and principal kinds, United States, census years 1919-37.





The consumption of rayon hosiery is less than that of cotton hosiery consumption. Total rayon hosiery consumption averaged 1.7 pairs during the 1930's. Prior to 1925, the consumption of these hose was negligible, but rose to a higher of 2 pairs per person in 1931. Men use these hose much more than do women. During one year only has production of rayon hose for women exceeded that of cotton hosiery.

The greatest actual increase in per capita consumption was in silk hosiery, which rose from three-tenths of a pair in 1919 to almost 4 pairs in 1937, an increase of 1,200 percent. The shift from cotton to silk hose for women began about 1925. The estimated consumption of silk hosiery for each woman was 3 pairs during this year against 8 pairs in 1937. There are variations from this, however. Some women wear other than silk hosiery, while some wear both cotton and silk. The majority of women, however, wear only silk hose and buy a dozen pairs or more each year. In extreme cases, women may use several dozen pairs during the year.

The consumption of woolen hose per person is comparatively small, averaging one pair to each 10 persons. Average consumption of hose made of mixed fibers, other than cotton-mixed, has been 1.3 pairs per person since 1919. The use of these stockings in 1923, however, was almost half as much as cotton hose but is now little more than consumption of wool hose.



## FIBERS USED IN HOSIERY MANUFACTURE

Census data for the consumption of fibers in the hosiery trade have not been available since 1931. During this depression year, when total hosiery production was down approximately 15 million dozen pairs, total consumption of all fibers in the hosiery trade was 141 million pounds (table 6), a decrease of 22 percent over the previous census year. The large reduction in cotton consumption was responsible for most of this decrease. The reduction in consumption of cotton used in hosiery, a steady decline beginning with the year 1925, agrees with the reduced production of cotton hosiery (table 1) and corresponds with the reduction in per capita consumption of cotton hose (table 5).

Judging from increased hosiery production, total consumption of fibers by the hosiery industry, with the exception of rayon, has no doubt increased since 1931. Rayon consumption in hosiery showed a steady increase up to and including 1931, but as shown by other than census figures (table 7), took a decided drop in 1933. Although rayon hosiery production for men was up in 1935 and 1937, actual consumption of rayon decreased, owing to the fact that this increased production was not enough to offset the decline in women's rayon hosiery.

The consumption of silk in hosiery has more than doubled since 1925. It amounted to less than 7 percent of total fiber consumption in hosiery in that year, and to almost 16 percent in 1931. In 1937 it probably was more than one-quarter of all fibers consumed in hosiery.

Table 6.--Consumption of fibers in the hosiery industry in pounds and bales, and percentages, United States, census years 1925-31

Fiber	Year			
	1925	1927	1929	1931
<u>Million pounds</u>				
Cotton.....	147	136	128	92
Rayon.....	12	20	21	22
Silk.....	12	18	23	22
Wool.....	8	9	9	5
Total.....	179	183	181	141
<u>Thousand bales</u> <sup>1/</sup>				
Cotton.....	294	272	256	184
Rayon.....	24	40	42	44
Silk.....	24	36	46	44
Wool.....	16	18	18	10
Total.....	358	366	362	282
<u>Percent</u>				
Cotton.....	82.1	74.3	70.7	65.3
Rayon.....	6.7	10.9	11.6	15.6
Silk.....	6.7	9.9	12.7	15.6
Wool.....	4.5	4.9	5.0	3.5
Total.....	100.0	100.0	100.0	100.0

<sup>1/</sup> Bales of 500 pounds. Fibers other than cotton converted to bales on a pound-for-pound basis.

Bureau of Home Economics. Rayon figures were compiled from data published in the Rayon Organon. Other figures compiled from the Biennial Census of Manufacturers. These data include various yarn and waste figures which have been converted to pounds of fiber. No data were collected for the census year 1933, and census data for 1935 and 1937 are not yet available.

Table 7.--Total consumption of selected fibers in all industries and in hosiery, and percentage each fiber consumed in hosiery is of total consumption of that fiber, United States, census years 1925-37

Fiber	Years						
	1925	1927	1929	1931	1933	1935	1937
	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds
<u>All industries</u>							
Cotton.....	3,265	3,802	3,667	2,842	3,282	2,976	3,870
Rayon.....	58	100	133	159	217	259	302
Silk.....	75	84	96	89	72	72	63
Wool.....	252	259	253	238	246	319	248
Total.....	3,650	4,245	4,149	3,328	3,817	3,626	4,483
<u>Hosiery industry</u>							
Cotton.....	147	136	128	92	—	—	—
Rayon.....	12	20	21	22	17	16	15
Silk.....	12	18	23	22	—	—	—
Wool.....	8	9	9	5	—	—	—
Total.....	179	183	181	141	—	—	—
<u>Percentage</u>							
	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Cotton.....	4.5	3.6	3.5	3.2	—	—	—
Rayon.....	20.7	20.0	15.8	13.8	7.8	6.2	5.0
Silk.....	16.0	21.4	24.0	24.7	—	—	—
Wool.....	3.2	3.5	3.6	2.1	—	—	—
Total.....	4.9	4.3	4.4	4.2	—	—	—

Bureau of Home Economics. All rayon figures compiled from data published in the Rayon Organon. Cotton, silk, and wool consumption figures of the hosiery industry from Biennial Census of Manufactures. No data for the consumption of these fibers were collected in 1933, and figures for 1935 and 1937 not yet available. Cotton and wool consumption figures for all industries from census data, and silk figures are imports for consumption.

Table 7 shows what percentage the consumption of fibers in the hosiery industry is of total consumption in the United States. Cotton used in hosiery has always been but a small percentage of total cotton consumed. In 1925, it amounted to 4.5 percent of total cotton consumption, and was down to 3.2 percent in 1931. Total rayon consumption in this country has increased steadily through the years, but the use of this fiber in hosiery decreased from approximately 21 percent of total United States rayon consumption in 1925 to about 14 percent in 1931 and 5 percent in 1937. There was a slight rise in the use of wool in hosiery in 1927 and 1929, but this was down to 2.1 percent of total wool consumption in 1931. The proportion of silk consumed in hosiery has continued to increase. In 1925, 16 percent of all silk consumed went into hosiery, and in 1931, approximately 25 percent of total silk was used by the industry. The silk manufacturers and related-industry group, which manufactures silk fabrics, consumed 70 percent of all silk in 1931 and 54 percent in 1935. Trade figures show that the hosiery industry is now the largest user of silk in the United States. It consumed 65 percent in 1937 and 72 percent in 1938.

If all hosiery produced in 1931 had been made entirely of cotton, the hosiery industry would have consumed, roughly, on a pound-for-pound basis, an additional 98,000 bales of cotton. Imported cotton hosiery, if produced here, would have accounted for another 1,108 bales, and imports



of other hosiery for 496 bales. The combined total, approximately 100,000 bales, amounts to more than half the cotton consumed by the hosiery industry in that year. It would raise the percentage of cotton used in the manufacture of hosiery to a figure larger than for any other year for which data are available. It should be noted that these calculations are made on the basis of 1931 data. Figures for later years would of course be larger.

#### Staple Lengths of Cotton Used

Both long and short staple cottons are utilized in making hosiery. Unfortunately for the purposes of this study, the data of the Bureau of the Census for cotton consumed by the hosiery industry are not segregated by varieties.

At one time, a large part of the long-staple cotton consumed in this country went into hosiery manufacture. This is no longer true, as is evident from the type of cotton hosiery being made and from the fact that the production of cotton hosiery is considerably less today than it was 2 decades ago. Moreover, a study of long-staple cotton (1-1/8 inches and longer) by the United States Tariff Commission several years ago <sup>3/</sup> shows that for the year 1932, 88 percent of all long-staple cotton consumed in the United States, both foreign and domestic, was utilized by the thread, tire fabric, and fine goods industries, and 12 percent by other industries, chiefly knit.

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<sup>3/</sup> Long-staple cotton. U. S. Tariff Commission. Report No. 85, Second Series. 1935.

Of the cotton consumed in the knit goods industry, two-fifths is used by the hosiery branch of the industry. The remaining three-fifths goes into the manufacture of underwear, outerwear, and knit cloth. Calculated from this, probably no more than 5 percent of the long-staple cotton used in the United States goes into hosiery. This amounts to about one-tenth of all cotton consumed by the industry. According to these figures, the larger part of the cotton used, approximately 90 percent of it, must have a staple length of less than 1-1/8 inches.

This is also indicated by the data available on the manufacture of combed and fine yarns. For the census years 1929, 1931, and 1935, approximately 25 percent of all yarns produced were combed, while only 7.5 percent of total cotton yarns were made in counts of 41 and over. In all probability, the cotton going into these counts of yarn is long staple since, when these yarns are converted into bales of cotton, the figures agree with those of long-staple cotton consumed during these years. Therefore, the larger part of the combed yarns consumed must be made of cotton shorter than 1-1/8 inches and have a count of less than 41s.

## COTTON YARN MANUFACTURE

There is much we need to know concerning the relative spinning utility of various long-staple cottons. The full extent to which they may be used interchangeably in the manufacture of various textile products is not known. Various spinning tests have been made primarily to learn the relative merits of the 3 best long-staple cottons available, both foreign and domestic, and whether it was necessary to use these cottons for the successful manufacture of fabrics intended for mechanical purposes. Strength was the chief factor under consideration.

In general, spinners want a constant supply of the cotton which they have been accustomed to using. <sup>4/</sup> They claim more waste for one and less yarn strength for another. Many manufacturers prefer Egyptian long-staple cotton for their purposes, even though American-Egyptian cotton has a longer staple, is similar in many respects to Egyptian cotton, and can be used in the majority of cases for the same manufacturing purposes.

To some extent, improved methods of manufacture have allowed the use of shorter cotton fiber than was used formerly. Too short a fiber, however, is not feasible for use where strength is an essential requirement and where yarns are spun into fine counts.

No comprehensive tests have been made showing the relative

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<sup>4/</sup> Quality of the cotton spun in the United States. U. S. Dept. of Agr. Mineo. June 1929.



merits of medium and long lengths of Upland cotton for certain uses. But from experience or through the media of their own testing laboratories, manufacturers sometimes learn that cotton of one length can be substituted for cotton of a longer length without any appreciable loss in the qualities essential to the use of the fabric. A case in point is that of the tire industry.<sup>5/</sup>

.....During 1920.....manufacturers began to explore the possibilities of using the shorter cottons.....It was discovered that by increasing the elasticity of the cord fabric, the strength requirements could be considerably reduced and at the same time the life of the tire significantly increased.

.....American cotton now constitutes over 95 percent of all the cotton used in the United States for making tire fabrics.....It is worth noting that more than two-thirds of the American cotton used in making tires during 1935-36 was 1-1/16 inches or shorter. This is in sharp contrast to what the distribution was 15 years ago when.....over 90 percent of all the cotton used in tires was 1-1/8 inches or longer. Today, only about one-third, or less, of the cotton used in making tire fabrics is as long as 1-1/8 inches.....over half.....falls within the range 31/32-inch to 1-1/16 inches, inclusive.

#### Cotton Yarns for Hosiery

There is a wide difference in the construction of various classes of cotton hosiery, especially between men's and children's hosiery and women's. These variations in construction affect the kind of yarn used, and the range in staple length of the cotton utilized is wide.

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<sup>5/</sup> Cotton used in tire fabrics. U. S. Dept. of Agr. Mimeo. Oct. 1937

Coarse quality carded yarns made from cotton waste and short staple cotton are used in the manufacture of some cotton hose, such as men's cheap work socks. Carded yarns of about 4s to 24s are used for men's, women's, and children's cheap hose, and 18s to 40s for better quality women's seamless hose.

Men's and children's better type cotton hose and women's full-fashioned lisle stockings are made of fine quality yarns which are combed as well as carded. These yarns range from 40s to as high as 120. The cotton used for making them is from 1-1/16 inches for the lower count to the longest staple cotton for the highest count.

When the cotton has been carded, but not combed, the yarn is not smooth and contains impurities. The fibers are predominantly short and of irregular lengths, and do not lie parallel. The yarn made of carded cotton is usually uneven. The reverse is true of combed cotton. Combing removes a high percentage of the shorter fibers. The resulting cotton fiber is smooth, glossy, and relatively free from impurities. The fibers lie parallel and are fairly uniform in length. The yarn spun from combed cotton is even, and has a greater tensile strength than carded yarn.

Combed cotton can be spun to finer counts than carded cotton, but the added cost of the combing process and the extra loss in the form of waste make combed yarns more expensive to produce. Most of the waste is recovered, however, and is spinnable.

Not all combed cotton is made into fine yarn, however. Combed cotton is necessary in making yarn for coarse fabrics where strength is important, such as tire and airplane fabrics. Two strands of combed yarn may be twisted or plied for still greater strength. Fine, 2-ply, tightly twisted and gassed combed yarn made of long-staple cotton is known as lisle yarn. This name is used also to distinguish the hose made of this yarn. Combed yarn may be mercerized, which is the process of treating it, while under tension, with strong alkali. This makes the yarn still stronger and more lustrous, and holds dye better than untreated yarn. Mercerized yarn is first gassed 6/ in order to remove the fuzzy particles that still adhere to the yarn, and it is then ready for knitting into stockings. The proportion of combed and mercerized yarns to total yarns consumed in the hosiery industry is larger than for any other industry using these same yarns.

Carded yarns produced in the United States average about 75 percent of total cotton yarns. More than half of these yarns have a count of 20s and under. The next largest group has a count of 21s to 40s. Very little yarn of a count above 120 is spun in the United States. The proportion of the cotton that can be used to spin high count yarns is small compared with total long-staple cotton available. High count yarns are used in making lace, but most of this yarn is imported, and constitutes a

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6/ Gassed or singed yarn has a smooth texture which gives a clear appearance to the knitted stocking.

sizeable portion of total yarn imports. Total yarn imports, however, are relatively small. United States yarn exports exceed yarn imports.

#### LONG STAPLE COTTON AVAILABLE IN THE UNITED STATES FOR HOSIERY

From the standpoint of competition with silk hose, the use of long-staple cotton is of great importance. Only from such cotton can hose be produced that are acceptable to purchasers interested chiefly in appearance. All of the long-staple cottons produced commercially in the world have at some time or other been planted experimentally in the United States. However, only 3 varieties are now grown here in significant quantities, namely, American Upland, American-Egyptian or Pima, and Sea Island. Production of long-staple cotton in foreign countries is larger than all of these combined.

#### Long-Staple Upland

Long-staple Upland cotton ranges from 1-1/8 inches to 1-1/4 inches and longer. The bulk of it is of 1-1/8 inches to 1-5/32 inches. The amount over 1-1/4 inches is very small. Production of long-staple Upland is considerably larger than for Pima and Sea Island both. It averaged 752,400 bales for the 10 years beginning with 1928-29, when statistics for production of cotton by length were first compiled, and the 948,000 bales grown in 1937-38 were the largest of any one of these years. Production for 1938-39 is 1,002,200, the largest on record.



Upland long-staple cotton is grown to some extent in each of the major cotton growing States, but of the 10 crops, 1928-37, an average of 60 percent of total was grown in Mississippi. Because the yield per acre of long-staple cotton is lower, in general, than for short-staple, it is necessary to have a very fertile soil for the successful growing of long-staple cotton. The rich Delta soil of this State is one of the most fertile in the country. It has a high annual rainfall and is frost-free two-thirds of the year. The most serious factor limiting production here is the boll-weevil, which is difficult to control because of the high humidity. An early-maturing variety of cotton called Delfos has been developed in this district, and has proved successful because its early maturity escapes the greatest boll-weevil damage. The estimated yield per acre of cotton grown in Mississippi in 1938-39 is 53 percent larger than the average for the 10 years 1927-36, but 15 percent less than last year.

A variety of Upland cotton named Acala is grown in the irrigated Southwest, comprising Arizona, California, New Mexico, and Southwestern Texas. Very strict measures are taken in this region to keep the strain of seed pure. In California, it is forbidden by law to grow any other cotton cotton but Acala. During the season 1937-38, 54 percent of the California cotton was 1-1/8 inches and longer. For the United States as a whole, during the 10-year period 1928-37, the proportion of Upland cotton



in the crop shorter than  $15/16$  inch in staple has decreased appreciably, but the proportion of long-staple to total varies from year to year because of the concentration of the growing centers. In 1934-35, it was 8.7 percent of total, the largest for the 10 years 1928-37, but only 5.2 percent in 1937-38, and 8.6 percent of total for 1938-39.

California, New Mexico, and Arizona have had the largest yields per acre for the 10 years 1927-36. Estimated yield for the present season is 602 pounds, 459, and 458, respectively, for these states—an increase of 29, 17, and 29 percent over the 10-year average. The intensive system of cultivation, the uniform growing season, and the strict measures taken to destroy insect pests and to keep the strain of seed pure are responsible for this high yield.

#### American-Egyptian or Pima

Pima cotton was developed from a variety called Yuma which was originally evolved from Egyptian Metafifi. The bulk of this cotton ranges from  $1-1/2$  inches to  $1-3/4$  inches in length. The cultivation of Pima cotton on a large scale was begun in 1917-18, and attained the former importance of Sea Island cotton in 1920-21, when 93,000 bales were produced. Under suitable growing conditions, then, it is possible for production of Sea Island and Pima to approximate a quarter of the production of long-staple Upland.

The growing of Pima cotton has proved successful in Arizona, the only State producing Egyptian-type staple cotton, the Pima and the Pima-Sakel cross, or S x P. This cotton is not suited to cultivation in the Southeastern States because of the greater susceptibility to disease in this region. Arizona has had little trouble with insect pests.

The entire Pima crop is grown under irrigation, a condition similar to the country of its origin. Plantings have been completely isolated from other cottons. Although yield per acre for all cotton grown in Arizona is one of the 3 highest, yield of Pima has averaged only 233 pounds, compared with 355 for all cotton grown in that State. This is considerably larger than the yield per acre of Sea Island cotton, however.

#### Sea Island

Sea Island cotton has a staple length of 1-1/2 inches to 2 inches, and is the most valuable of the world's cottons. This cotton was of considerable importance up to 1918-19, when growth was ruined by the infestation of the boll-weevil. It attained a maximum of 119,000 bales in 1911-12, but was down to 7 bales in 1929-30. During the past few years, the growing of Sea Island cotton in the United States has been revived and is gradually gaining in importance. In 1937-38, production was 3,200 bales and 4,300 bales in 1938-39.

Sea Island cotton is no longer grown in South Carolina because the long growing period necessary for this cotton makes it susceptible to boll-weevil attacks in this region. It is now confined exclusively to Georgia and Florida. This cotton requires a longer season for maturity than either Pima or Upland. During the season 1927-38, Sea Island yielded 84 pounds to the acre, while the estimated yield for the season 1938-39 is 45 pounds.

Shortly after the infestation of Sea Island cotton by the boll-weevil, an effort was made to grow Meade cotton, which approximates Sea Island in length and other qualities, in Northeastern Texas. The bolls were more nearly round and not so difficult to pick. This cotton grew under weevil conditions, and for a time it appeared very promising. It was often marketed as Sea Island cotton. But short-staple Upland and Sea Island cottons were soon planted in the same location, with no attempt made to isolate the fields planted to Meade. Seed-mixing led to irregular fibers, with a consequent prejudice against Meade cotton by manufacturers.

#### Imports of Long-Staple Cotton

Imports of long-staple cottons have been declining steadily since the imposition of a 7 cents import duty on cotton 1-1/8 inches and longer in staple on June 18, 1930. Of all cotton 1-1/8 inches or longer consumed by American mills during the year 1929-30, the year

before the duty went into effect, 46 percent was foreign. This was down to 7 percent in 1937-38.

Compared with the 8 earlier years, the importation of foreign long-staple cotton during the 8 years since the duty went into effect has fallen off about 75 percent. Most of the long-staple cotton imported is Egyptian.

Carry-over of all long-staple cotton in the United States on August 1, 1938 was only 5 percent of total carry-over, the smallest on record. Total consumption of this cotton in 1937-38, however, was down approximately one-fourth from the 1934-35 high. The reduction in consumption of foreign long-staple cotton was replaced almost entirely by long-staple American Upland cotton. The steady decline in total consumption of long-staple cotton beginning with 1935-36 can be accounted for only by reduced consumption in those industries which normally use this cotton.

#### PRICE AS A FACTOR INFLUENCING THE CONSUMPTION OF HOSIERY

##### Prices of Raw Materials and of Hosiery

Relative prices of yarns of different fibers have an important bearing on the specifications of hosiery. One of the causes for the shift from cotton to silk was undoubtedly the great drop in the price of silk. Table 8 shows prices and index numbers of the chief fibers used



Table 8.--Wholesale prices and index numbers of cotton, rayon, and silk,  
United States, 1922-23 to 1937-38

Year beginning August 1	Prices			Index Numbers <sup>1/</sup>		
	Cotton <sup>2/</sup>	Rayon <sup>3/</sup>	Silk <sup>4/</sup>	Cotton	Rayon	Silk
	Dollars	Dollars	Dollars	Percent	Percent	Percent
	per pound	per pound	per pound			
1922-23	.36	2.80	8.50	100	100	100
1923-24	.40	2.43	7.20	111	87	85
1924-25	.49	2.03	6.34	136	72	75
1925-26	.37	1.97	6.52	103	70	77
1926-27	.30	1.53	5.86	83	55	69
1927-28	.37	1.50	5.07	103	54	60
1928-29	.34	1.38	5.00	94	49	59
1929-30	.29	1.13	4.36	81	40	51
1930-31	.21	.83	2.54	58	30	30
1931-32	.16	.71	1.83	44	25	22
1932-33	.17	.58	1.60	47	21	19
1933-34	.23	.63	1.48	64	22	17
1934-35	.23	.57	1.33	64	20	16
1935-36	.23	.57	1.81	64	20	21
1936-37	.27	.61	1.91	75	22	22
1937-38	.22	.57	1.69	61	20	20

<sup>1/</sup> Base is 1922-23.

<sup>2/</sup> Average of S. M. 1-1/16 inches and better Upland cotton, based on prices of Middling 7/8-inch cotton plus grade and staple premium as quoted in the 10 Southern spot markets; Pima No. 2 and Egyptian Saks, New England mill points.

<sup>3/</sup> Grade A, 150 denier, first quality, New York.

<sup>4/</sup> Japanese raw silk, 78 percent double extra crack, 13/15 denier, New York

Bureau of Home Economics. Cotton prices from Department of Agriculture; rayon and silk prices from Bureau of Labor Statistics.



in hosiery manufacture. The general trend for all fibers since 1922-23 has been downward, with prices of cotton fluctuating considerably. In 1922-23, the price of rayon was 8 times the price of cotton, but was down to less than 3 times the price of cotton in 1937-38. For these same years, the price of silk decreased from approximately 24 times to about 8 times the price of cotton. The index numbers show a drop in price from the base year 1922-23 of 80 percent for both rayon and silk, and 39 percent for cotton.

The wholesale prices of hosiery in table 9 are representative of the type of cotton and silk hose which are sold in large quantities. There is a greater difference between the price of silk and cotton hosiery for women than there is in men's hose of the same 2 constructions. The wholesale price of women's full-fashioned service weight silk hose with cotton tops, heels, and toes was 43 cents a pair in 1938, down 57 percent from the 1924 price, while women's coarse mercerized cotton hose sold for 12 cents a pair, a decrease of 42 percent from the 1924 price.

Even though the price of cotton hose has not decreased so much as silk hose, most of the former are still cheaper than silk. Durable full-fashioned cotton stockings can be purchased for less than durable full-fashioned silk ones. However, at present, there is not a wide difference in price between women's silk hose and cotton hose which are comparable to silk in appearance. Such cotton hose must be full-fashioned, made of long staple cotton and of combed, mercerized and gassed yarns of fine counts.

Table 9.—Wholesale prices of women's and men's cotton and silk hose, per dozen pairs, United States, 1924-38

Hosiery					
Women's			Men's		
Year	Cotton <sup>1/</sup>	Silk <sup>2/</sup>	Cotton <sup>3/</sup>	Silk <sup>4/</sup>	
	Dollars	Dollars	Dollars	Dollars	
1924	2.41	11.92	1.80	5.50	
1925	2.38	11.84	1.75	5.25	
1926	2.33	12.17	1.62	4.80	
1927	2.28	11.00	1.59	4.25	
1928	2.28	9.80	1.60	3.95	
1929	2.19	9.31	1.20	3.85	
1930	1.96	7.90	1.18	3.57	
1931	1.69	5.76	1.16	2.75	
1932	1.11	4.40	.56	2.28	
1933	1.42	4.94	.77	2.36	
1934	1.68	5.18	1.00	2.29	
1935	1.50	5.24	1.00	2.12	
1936	1.46	5.14	.87	2.07	
1937	1.57	5.46	.86	2.09	
1938	1.40	5.12	.80	2.00	

<sup>1/</sup> Mercerized, 220 needles.

<sup>2/</sup> Full-fashioned, 39 to 42 gauge, 7 thread tram silk, 13/15 denier, pure dye, mercerized, 25 inch boot, 4 inch hem, lisle sole, toe, and heel.

<sup>3/</sup> Carded yarn, 164 needles, 3 thread heel and toe, knitting weight 16 ounces.

<sup>4/</sup> 240 needles, 12 thread silk, mercerized top, heel, toe, and instep, split sole construction.

Bureau of Home Economics. Data from Bureau of Labor Statistics

Many of the cheapest cotton hose are circular knit and made of coarse, carded yarns, not mercerized or gassed. The labor cost in producing such hose and the quantity of yarn required are much less than for full-fashioned ones. If their quality and appearance could be improved and their cost still kept in the lower price ranges, the consumption of cotton hosiery would be greatly increased.

The difference in price per pair of men's cotton and silk hose is not great. Men's cotton socks made of carded yarn sold for 7 cents a pair wholesale in 1938, down 33 percent from the 1924 price. The wholesale price of men's silk socks during this same year was 17 cents a pair, a decrease of 48 percent from the 1924 price. The consumption of men's silk hose has not increased in proportion to this decrease in price. Durability in men's hose, then, is of primary importance, and is a far more essential factor than price.

#### THE HOSIERY INDUSTRY

In 1937, the hosiery industry of the United States employed 9 percent more wage earners than in the previous census year. There was a 12 percent increase in wages and a 3 percent increase in average wage per earner. The industry paid 22 percent more for its materials, and the value of its products was 15 percent larger than the 1935 value.

Total hosiery mills in 1937 were 746, an increase of 7 percent

over 1935. In 1938 there were 869 mills, 371 of which were making full-fashioned hose. 498 were seamless hosiery mills. Pennsylvania still leads in total United States hosiery production. In 1937, it produced approximately one-fourth of all types of hosiery and more than one-half of all women's full-fashioned hosiery. The Southern States lead in the number of new machines installed. They now have about 25 percent of the nation's full-fashioned knitting machines and more than half the seamless knitting machines. In January 1937, there were 15,830 full-fashioned knitting machines in place, an increase of 6 percent over 1935. In March 1938, there were 15,751 machines, of which 400 were not in use.

Use of antiquated machinery and failure to keep the machines properly conditioned can cause more waste of material and production of defective hosiery, which lead to manufacturing losses, than waste which results from the processing of raw materials. Although many antiquated hosiery machines have been scrapped, more than 50 percent of the full-fashioned knitting equipment is still over 10 years old. Only a few over 1,000 full-fashioned hosiery machines have been added to the industry since 1935.

Newer machines for making full-fashioned hose have more attachments and sections than the older type machines. Among the more notable improvements of the past several years are finer yarn gauges and higher speeds. The gauge of a full-fashioned hose refers to the number of needles set to each one and one-half inches on the knitting



machine. A 45-gauge hose means that 45 needles have been used to each one and one-half inches, or 30 needles for each inch. The fineness of cotton hosiery depends, to a certain extent, on the number of needles to the machine. One of the important factors in the appearance of cotton stockings is the texture or closeness of knitting. A machine with 30 needles to the inch knits a finer texture stocking than one with 26 needles.

Although full-fashioned knitting machines of 42-gauge still make up approximately half the total number of hosiery equipment, the 45-gauge type machine of 24 sections has accounted for the largest increase in the past 10 years. <sup>1/</sup> The 39-gauge machines are fast disappearing from use. The 42-gauge machine is now considered medium and the

<sup>1/</sup> Production, in percentages, of "Reading" machines as to sections and gauge, from the Reading Machine Company's 1938 statistical folder:

Year	Sections						Total
	18	20	24	26	28	30	
	Percent	Percent	Percent	Percent	Percent	Percent	
1927.....	6	82	12	—	—	—	100
1937.....	—	8	65	17	4	6	100

	Gauge					Total
	39	42	45	48	51	
	Percent	Percent	Percent	Percent	Percent	
1927.....	4	68	21	7	—	100
1937.....	—	10	79.5	.5	10	100

The output of full-fashioned knitting machines by this company represents over 75 percent of total production. See Knitting Full-Fashioned Hosiery by Max C. Miller, M. E. 1937



45-gauge fine. A 51-gauge machine was unheard of not many years ago, but is being used at present, and their number is increasing at a fast rate. The speed of the newer knitting machines can be brought up to more than 60 revolutions a minute, but in general, 60 is considered best. Nearly all of the 45-gauge machines operate at high speeds.

Cotton hose can be made on some full-fashioned machines that ordinarily use silk, but no cotton yarn coarser than 50s 2-ply can be used without making some adjustment in the machinery. At one time, full-fashioned hosiery machines could make no more than one stocking at a time. Then, gradually, longer machines were built. Today there are knitting machines in use that can knit as many as 30 stockings simultaneously. Only one stocking can be knit on a seamless hosiery machine at one time.

Total seamless hosiery machines amounted to 108,309 in 1935. Twenty-one percent of these machines were for knitting women's hosiery and 79 percent for men's and children's. In that year, women's seamless hosiery amounted to 12 percent of total production, while men's and children's were 54 percent. The potential capacity of these seamless machines is therefore much larger than their current output. Not many seamless hosiery machines have been scrapped. New machines are added and the number continues to increase. In 1937, the number of seamless machines was 10 percent larger than in 1935 and totaled 120,000. Unlike full-fashioned machinery, it is not a simple matter to attach new parts

to seamless hosiery machinery, and the old ones continue to lag far behind the newer ones in speed and productive capacity.

### SUMMARY

Total hosiery production in 1937 was 10 percent less than the 1929 high. Although full-fashioned hose have increased at a rapid rate, about two-thirds of total production is still seamless. Nearly all of the full-fashioned hose are for women. In 1935 and 1937, less than 1 percent was for men and children.

Cotton hosiery production has declined more than 50 percent over a period of 18 years. The larger part of this decline was in women's hosiery, which amounted to less than 5 percent of total women's hosiery in 1937, compared with 72 percent in 1919.

Production of rayon hosiery increased from 1919 to 1931. There was a decided drop in 1933, and production in 1937 was 13 percent below that for 1931. Beginning with 1927, the larger portion of rayon hose has been for men. Only 5 percent of women's hose in 1937 was of rayon.

The large increases in silk hosiery production have been mostly in women's hosiery. Silk hosiery for women in 1919 was less than 4 percent of total women's hosiery production. In 1937 they amounted to 86 percent. In the latter year, only 4 percent of all silk hose were for men and children.

Compared with production of hosiery in this country, hosiery

imports are small. Cotton hose make up the majority of United States hosiery imports. Imports of both total and cotton hosiery have averaged considerably less than they did in the years before the World War. United States hosiery exports, and particularly cotton hosiery exports, have fallen off also. During the past 7 years, exports of cotton hosiery have been small compared with exports during the 20's.

Per capita consumption of total hosiery increased 1.6 pairs since 1919, and silk hosiery 3.6 pairs. Cotton hosiery decreased 3.2 pairs per person. Estimated per capita consumption of silk hose for women was 8 pairs in 1937.

In 1931 consumption of cotton in the hosiery industry was 63 percent of 1925 consumption. Rayon and silk both showed an increase of 83 percent, while wool consumption decreased 37 percent. Later consumption figures are not available, but judging from hosiery production data, consumption of cotton in 1937 was larger than in 1931 and rayon considerably less. The very large increase in silk hosiery production indicates a substantial increase in consumption of silk.

The larger part of the combed yarns used in the United States are made of short-staple cotton and have a count of less than 41. Very little long-staple cotton has been used in recent years in making hosiery. Approximately 90 percent of the cotton utilized by the hosiery industry has a staple length of less than 1-1/8 inches.

The long-staple cotton grown in the United States is considerably less than the combined production in all other countries. A large part of the long-staple cotton consumed by all industries in this country in former years was of the imported variety, but in 1937-38, consumption of foreign long-staple cotton was only 7 percent of total long-staple cotton consumed. The use of long-staple American Upland has increased proportionately. In 1929-30, long-staple American Upland cotton amounted to 50 percent of total long-staple cotton consumed and to 92 percent in 1937-38. Beginning with 1935-36, total consumption of all long-staple cotton has been decreasing.

From the standpoint of fibers used, the index numbers of these fibers show that, relatively, raw cotton prices did not decrease as much as did the prices of raw silk and rayon. Wholesale prices of women's silk hose also show a relatively greater decrease compared with wholesale prices of cotton hose.

New machines are being added to the hosiery industry, but at a slow rate. The full-fashioned knitting machinery over 10 years old amounts to more than 50 percent. There are at present approximately 16,000 full-fashioned hosiery machines in the country and 120,000 seamless. However, only one stocking can be knit on a seamless hosiery machine at one time, while as many as 30 can be knit simultaneously on a full-fashioned one.







